

Claims

1. A cardiac rhythm management device capable of detecting intrinsic depolarization events, comprising:

5 a pulse generator for selectively stimulating a plurality of sites in at least one chamber of a patient's heart;

a sensing circuit configured to receive signals indicative of the depolarization events from at least one electrode positioned within at least one chamber of the patient's heart; and

10 a controller configured to receive data from the sensing circuit and to control the pulse generator, wherein the controller prevents the use of data to detect intrinsic depolarization events during a plurality of programmable refractory periods temporally defined relative to a preprogrammed sensed triggering event.

15 2. The cardiac rhythm management device, as in Claim 1, wherein the sensing circuit includes at least one sensing channel for the atrium and at least one sensing channel for the ventricle wherein one of the plurality of refractory periods is a floating refractory period that may be applied to said at least one sensing channel for the atrium and said at least one sensing channel for the ventricle.

20 3. The cardiac rhythm management device, as in Claim 1, wherein at least one of the programmable refractory periods is initiated a predetermined amount of time after the end of a first refractory period, the first refractory period being initiated coincidental with sensing an intrinsic event.

25 4. The cardiac rhythm management device, as in Claim 1, wherein at least one of the programmable refractory periods is triggered by a stimulation of a pre-selected chamber of the heart.

30 5. The cardiac rhythm management device, as in Claim 1, wherein the triggering event is a sensed intrinsic event.

6. The cardiac rhythm management device, as in Claim 1, wherein the triggering event includes a paced event.

7. The cardiac rhythm management device, as in Claim 1, wherein the triggering event includes an intrinsic atrial event.

8. The cardiac rhythm management device, as in Claim 1, wherein the triggering event includes an intrinsic ventricular event.

9. The cardiac rhythm management device, as in Claim 1, wherein the triggering event includes a paced atrial event.

10. The cardiac rhythm management device of claim 1 wherein the triggering event includes a paced ventricular event.

11. The cardiac rhythm management device, as in Claim 1, wherein preprogrammed sensed triggering events from the atrium are blanked during a floating refractory period.

12. The cardiac rhythm management device, as in Claim 1, wherein preprogrammed sensed triggering events from the ventricle are blanked during a floating refractory period.

13. The cardiac rhythm management device, as in Claim 1, wherein the controller initiates first and second refractory periods associated with the ventricle dependent upon sensed triggering events occurring in the atrium.

14. The cardiac rhythm management device, as in Claim 1, wherein the controller initiates first and second refractory periods associated with the atrium dependent upon sensed triggering events occurring in the ventricle.

15. A multi-chamber cardiac rhythm management device functioning in a pre-selected stimulation mode and capable of atrial and ventricular tracking, said device comprising:

sensing means for sensing at least one of atrial and ventricular events and transmitting signals containing information corresponding to sensed events;

stimulation means for selectively stimulating pre-selected chambers of the patient's heart; and

a controller coupled to said means for sensing and said stimulation means, wherein during a cardiac cycle said controller manipulates the means for sensing to thereby create a first and second refractory period of sensed events for pre-selected chambers during the cardiac cycle.

16. The cardiac rhythm management device as recited in claim 15, wherein the means for sensing includes a designated sensing channel for the atrium and a designated sensing channel for the ventricle wherein the controller manipulates the sensing channels to create the first and second refractory periods.

17. The cardiac rhythm management device as recited in claim 15, wherein the second refractory period is initiated a predetermined amount of time after the end of the first refractory period.

18. The cardiac rhythm management device as recited in claim 16, wherein the second refractory period is initiated a predetermined amount of time after the end of the first refractory period.

19. The cardiac rhythm management device as recited in claim 15, wherein the second refractory period is initiated if intrinsic events from the atrium are sensed.

20. The cardiac rhythm management device as recited in claim 15, wherein the second refractory period is initiated if intrinsic events from the ventricle are sensed.

21. The cardiac rhythm management device as recited in claim 15, wherein sensed events from the atrium are blanked during the second refractory period.

22. The cardiac rhythm management device as recited in claim 15, wherein sensed events from the ventricles are blanked during the second refractory period.

23. The cardiac rhythm management device as recited in claim 15, wherein the controller initiates first and second refractory periods associated with the ventricles dependent upon events occurring in the atrium.

24. The cardiac rhythm management device as recited in claim 15, wherein the controller initiates first and second refractory periods associated with the atrium dependent upon events occurring in the ventricle.

25. A cardiac rhythm management device capable of uni-polar or bipolar atrial and ventricular stimulation, said cardiac rhythm management device including:

- (a) a controller;
- (b) means for stimulating at least one of an atrium or ventricle of a heart, said means electrically coupled to said controller;
- (c) sensing means for sensing a cardiac electrogram, said sensing means electrically coupled to the controller;
- (d) an atrial lead having an atrial electrode electrically coupled to the controller;
- (e) a ventricular lead having a ventricular electrode electrically coupled to the controller; and
- (f) said controller having means for defining a refractory period and a floating refractory period for a predetermined cardiac cycle for a predetermined chamber of the heart.

26. The cardiac rhythm management device as recited in claim 25, wherein the sensing means includes a designated sensing channel for the atrium and a designated sensing channel for the ventricle wherein the controller manipulates the sensing channel to create the refractory period and floating refractory period.

27. The cardiac rhythm management device as recited in claim 25, wherein the floating refractory period is initiated a preprogrammed amount of time after the end of the refractory period.

28. The cardiac rhythm management device as recited in claim 26, wherein the floating refractory period is initiated a preprogrammed amount of time after the end of the refractory period.

29. The cardiac rhythm management device as recited in claim 25, wherein the floating refractory period is initiated if intrinsic events from the atrium are sensed.

30. The cardiac rhythm management device as recited in claim 25, wherein the floating refractory period is initiated if intrinsic events from the ventricle are sensed.

31. The rhythm management device as recited in claim 25, wherein sensed events from the atrium are blanked during the floating refractory period.

32. The rhythm management device as recited in claim 25, wherein sensed events from the ventricles are blanked during the floating refractory period.

33. The rhythm management device as recited in claim 25, wherein the controller initiates a refractory period and floating refractory period associated with the ventricles dependent upon preprogrammed triggering events occurring in the atrium.

34. The rhythm management device as recited in claim 25, wherein the controller initiates a refractory period and floating period associated with the atrium dependent upon preprogrammed triggering events occurring in the ventricles.

35. A method for stimulating a pre-selected chamber of a patient's heart using a cardiac rhythm management device of the type which senses and determines independently atrial and ventricular depolarization events and includes a plurality of programmed timing and stimulation intervals, said method comprising the steps of:

- a) sensing cardiac electrograms and detecting an intrinsic event occurring in pre-selected chambers of the patient's heart; then
- b) identifying a time at which the intrinsic event is sensed;
- c) initiating a first interval for blanking detected events for a predetermined cardiac cycle;
- d) initiating a second interval for blanking detected events for the predetermined cardiac cycle; and
- e) stimulating pre-selected chambers in accordance with a predetermined stimulation protocol so long as an intrinsic cardiac event having an amplitude exceeding a predetermined amount is not sensed between the first and second intervals.

36. The method as recited in claim 35, wherein the second interval is initiated a predetermined amount of time after the end of the first interval.

37. The method as recited in claim 35, wherein the second interval is initiated when an intrinsic event from the atrium is sensed.

38. The method as recited in claim 35, wherein the second interval is initiated when an intrinsic event from the ventricle is sensed.

39. The method as recited in claim 35 wherein the blanked event is associated with the atriums.

40. The method as recited in claim 35, wherein the blanked event is associated with the ventricle.

41. A method for programming a cardiac rhythm management device to enhance its ability to sense intrinsic depolarization events while avoiding detection of artifacts and after-potentials comprising the steps of:

(a) examining cardiac electrogram data originating from different sites in a heart to identify unwanted potentials;

(b) determining a temporal relationship between the unwanted potentials and a known, repeatable, intrinsic or paced event;

(c) programming the known, repeatable, intrinsic or paced event as a trigger event that initiates a blanking or refractory period in a sensing channel exhibiting the unwanted potential;

(d) programming a delay value that starts with the trigger event and extends to a point in time before which the unwanted potential is predicted not to occur; and

(e) programming a duration of the blanking or refractory period that begins with the end of the delay and extends to cover a period of time during which the unwanted potential is predicted to occur.